

Liquid Nitrogen Facility

Who: Open to anyone working in a Western research lab that requires LN2 for their research. To become a registered user, you must attend a training session.

Where: Basement Floor of Chemistry Room 002B, just inside the loading dock

When: Open 8-4 on business days. After hours (24/7) via Western One Swipe Card

What: The Liquid Nitrogen Facility is a self-serve operation. The facility provides all the equipment necessary to dispense liquid nitrogen safely. We operate 2 separate filling stations. One station has threaded dispensing and exhaust fittings for filling the larger pressurized dewars and the other filling station has a dispensing tube for filling the smaller open to atmosphere dewars.

How: We offer training the **First Wednesday of every Month at 2:00 PM** at the Liquid Nitrogen Facility. Bring the following:

- Your E-mail Address
- Western One ID Card (UWO ID #)
- Completion date of your current WHMIS Training.
- Speed Code(s) and account
- An empty dewar. You will fill this dewar as part of the training.

Problems

Training records Account(s) displayed/ available WHMIS	See Science Stores Customer Service Room 003 Chemistry Building
No flow on open to air dispenser	Check valve on top of wand
Problems dispensing Blank Screen Error Screens	See the Electronic Shop Room 023 Chemistry Building

Note to After Hours Users:

The wooden door must be propped open to dispense liquid nitrogen.

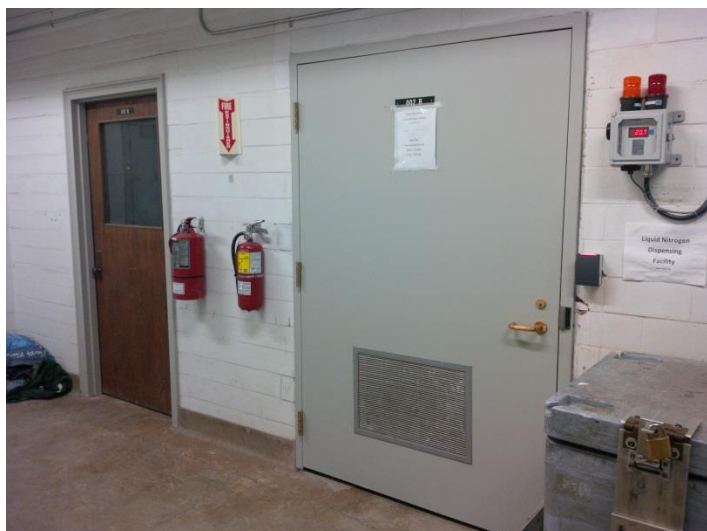
You must lock both doors when you are finished.

When the light on the proximity sensor is **GREEN** the door is unlocked.

When the light is **RED** the door is locked.

When you dispense liquid nitrogen after hours you will need to swipe once to unlock the door and then again when you are finished to lock the door.

When you leave, the light should be **RED!!!**



The Liquid Nitrogen Facility is located at the
Chemistry Loading Dock



Standard Operating Procedures

Liquid Nitrogen Dispensing

Facility Room 002B Chemistry

Building

Security

The Liquid Nitrogen Dispensing Facility (LNDF) is open from 8:00 am - 4:00 pm on business days.

After-hours access is available to registered users by using their "i Class Card" or "Western One Card". Note the perimeter doors to Chemistry are locked after 10:00 pm and on weekends. You will need to use your "i Class Card" or "Western One Card" to enter the Chemistry Building when the perimeter doors are locked.

The facility is open 24/7 to registered users.

There are 2 doors leading into the LNDF. The wooden door must always be left open when nitrogen is being dispensed.

When using the facility after hours, be **sure both doors are closed and locked** when you are finished filling.

Personal Safety Devices and Tools

Personal safety devices and tools are provided for your use.

On the rack you will find:

- 2 - full face shields
- 2 - sets of goggles
- 2 - pair of noise suppression ear muffs
- 2 - pair of cryogenic safety gloves
- 2 - 7/8 inch wrenches
- 2 - adjustable wrenches

Make good use of these items but be sure they go back on the rack when you are done.

If any items are worn out or damaged, please report them to Science Stores. chemstor@uwo.ca

If any items are missing when you arrive report them immediately to the following e-mail address. chemstor@uwo.ca

Failure to report missing items could result in you being billed for the replacement cost of the item.

Anyone found removing any of these items from the LNDF will have their liquid nitrogen dispensing privileges removed.



Figure 1. Personal protective equipment available in the LNDF.

Elevator Policy

For information about the University Cryogenics Liquids in Elevators Policy refer to the Western University Lab Safety Manual.

8.9.1 Transportation of cryogenic liquids in elevators

http://www.uwo.ca/hr/form_doc/health_safety/doc/manuals/lab_safety_manual.pdf

This policy is in place to protect a person from being trapped in a confined space with a liquid nitrogen dewar. In the confined space of an elevator, if the boil off from a liquid nitrogen dewar was rapid enough to displace enough O₂, breathing problems, or even death, could result.

In the Chemistry Building, only our large elevator is approved for cryogenic liquid transport.

There is a sign beside this elevator to identify it as an approved elevator. See picture below.



Figure 2. Sign beside the large elevator in the Chemistry Building.

As a transporter of liquid nitrogen you must follow this procedure.

There is another sign installed inside the elevator. It is a small sandwich board sign that is meant to be placed inside the elevator between the dewar and the doorway of the elevator when the dewar is being transported. This sign will warn potential passengers that they cannot enter the elevator at this time. When not in use this sign will hang on the hand rail inside the elevator.



Figure 3a. Elevator Warning Sign

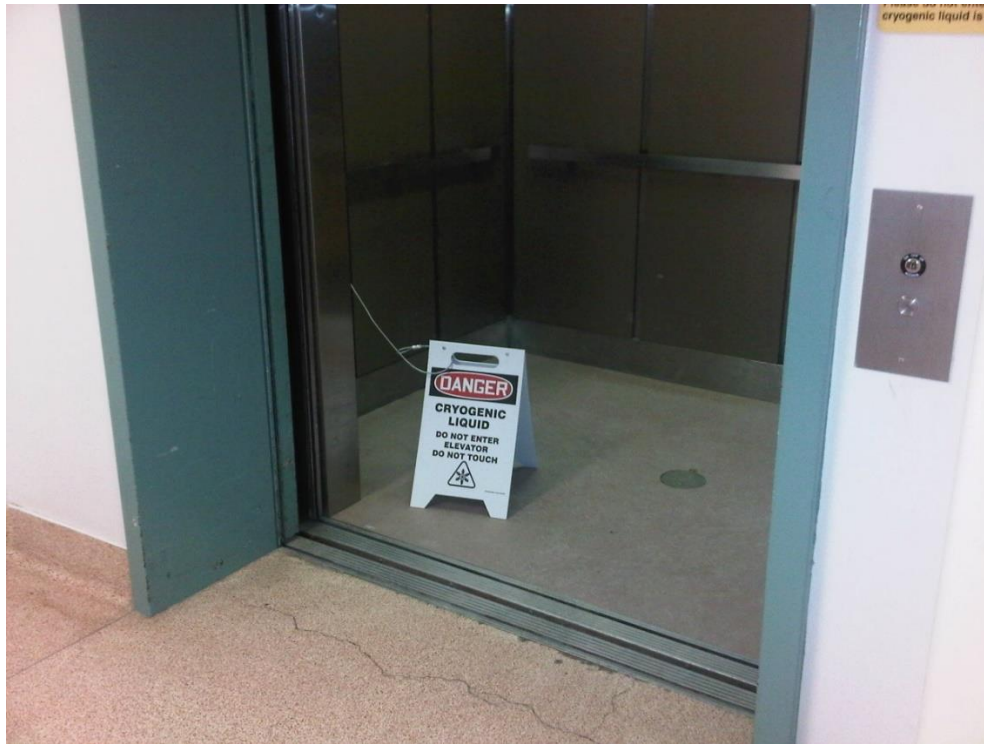


Figure 3b. Sandwich board sign to be placed between the liquid nitrogen dewar and doorway of elevator when transporting liquid nitrogen in the elevator.

Ventilation System

The LNDF has a high powered ventilation system to exhaust boiled off nitrogen gas which is a by-product of filling LN dewars. Too much nitrogen gas released in an enclosed area can cause the O₂ content of the air to decrease. If the O₂ level decreases below 19.0 % humans may begin to suffer oxygen depletion symptoms. For this reason dispensing is not allowed unless the ventilation system is working properly. The room ventilation comes on automatically just before dispensing starts. You should be able to hear this. The system does check to make sure the blower has come on and will disable dispensing if it cannot detect air movement. Air is collected from the ceiling, floor and directly from the filling stations. The room gets make-up air from 2 grills, one in the large green door and the other above the doors on that same wall. Exhaust air is blown out of the room and outside of the building to the loading dock area.

The wooden door must be open to dispense liquid nitrogen.

Never dispense liquid nitrogen if the ventilation system is not working properly.

Report any ventilation problems or any other problems to the Science Stores Staff or Chemistry Electronic Shop Rm 023.

In Case Of Emergency

Pressing the Emergency Stop Button located beside the door will stop all dispensing.

Notify Science Stores Staff, Chemistry Electronic Shop or Administrative Officer jcordic@uwo.ca of problem.



Figure 4. Emergency Stop button located beside main door.

Drager Oxygen Sensor

The O₂ detection system is used to monitor the O₂ levels in the LNDF. If the O₂ level moves outside the levels deemed safe for breathing (19.0 – 23.0%) the alarm will sound and the lights will flash. This will continue until safe levels are restored.

If the alarm flashes or sounds, all dispensing will stop. Leave the room immediately. Go far enough away to ensure a safe place to breathe fresh air.

Report the incident to Science Stores Staff, Chemistry Electronic Shop or Administrative Officer immediately.



Figure 5. The LNDF's oxygen sensor. The oxygen level value display is located just outside the LNDF.

Fill Procedure

Closed dewars will be filled using the port on the left-hand side of the LN manifold. Open dewars will be filled using the port on the right-hand side of the LN manifold.

Never leave a dewar unattended.

Always leave the wooden door open.

Closed Dewar

- Gloves are essential. The face shield and hearing protection are recommended.
- Connect flexible black latex exhaust hose to vent connector of dewar.
- Connect flexible stainless hose to liquid connector of dewar.
- Open vent valve of dewar. Wait for dewar to depressurise.
- Open liquid valve on dewar.
- Swipe Western One Card and select account.
- Press "Start" button to begin dispensing. The line will cool first and then begin dispensing.
- Nitrogen gas should blow through the latex hose, copper pipe and into 3 inch duct.
- When drops of LN appear at the copper exhaust pipe, the dewar is full. Usually 20-60 min. Approx 5 liters per min.
- Press "Stop" button to stop dispensing
- Shut off the liquid valve on the dewar.
- Shut off the vent valve on the dewar.
- Disconnect the flexible stainless hose from liquid connector of dewar.
- The flexible black latex hose will be frozen, leave it some time to thaw and become flexible again.
- Disconnect the flexible black hose from the vent connector of dewar, replace on hook.
- Replace any safety equipment or tools.
- Report any missing safety equipment or tools.
- When using the facility after hours, be **sure both doors are closed and locked when you are finished.**

Open Dewar

- Gloves, face shield and hearing protection are essential.
- Place fill line in your open dewar.
- Swipe Western One Card and select account.
- Press "Start" button to begin dispensing. There is a 5 second count down before dispensing begins.
- The valve on the top of the dispensing wand can be used to adjust the flow. Most users leave it wide open and it does not need to be closed when finished.
- Slowly open LN valve located on the manifold. Expect plenty of N₂ gas and lots of noise.
- When liquid appears at the top, press "Stop" to end dispensing
- Replace any safety equipment or tools
- Report any missing safety equipment or tools.
- When using the facility after hours, be **sure both doors are closed and locked when you are finished.**

Closed Dewar Filling Station



Figure 6. Closed Dewar Filling Station

Open Dewar Filling Station



Figure 7 Open Dewar Filling Station

Installation of the Bulk Liquid Nitrogen Tank

